LAB AND DOE OFFICIALS DISCUSS BIORESEARCH HISTORY AND SAFETY

The Laboratory has announced its intention to evaluate the possibility of adding additional capability for biological research in the form of a BSL-3 laboratory. (Link to News Release). In the course of initiating discussions with government and community leaders on this issue, several questions about safety and the Laboratory and the Department of Energy's interest in biological research were raised. The Newsbulletin recently sat down with Bioscience Division Director Jill Trewhella and John-Olav Johnsen, DOE's Manager for the Albuquerque Operations Biosurety Initiative, to get some in-depth answers to these questions.

Why is the Department of Energy interested in biological research?

Trewhella: We have a very long history of contributing fundamental advances to biology. It sometimes surprises people that the DOE, particularly in Los Alamos, has been working in the area of human health for many years, particularly connected with the activities and the environmental by-products of the early nuclear weapons work. We've been interested in how we can best protect the public and workers in the DOE complex.

One of the things that is remarkable is how many of the capabilities that were developed initially for energy production or nuclear weapons activities actually ended up being critical factors in fundamental health research, now used broadly in the clinical arenas. An historical example is the human genome project, considered to be one of the most fundamental contributions biology has made to human health and the future of medical research for the 21st century. This very important piece of work was enabled by research that was going on at Los Alamos, being done by people who came directly from working on our central nuclear missions. Theoretical physicist Walter Goad turned his attention in the 1970s to biomedical research, recognizing that there was a lot of DNA sequence information that could benefit biomedical research but there was no way for people to access it. He put together the first DNA database and made it available to biomedical researchers. At the same time, flow cytometry work was developed at LANL using lasers and flow methods to sort out cells. It's now a principal technology in practically every diagnostic laboratory in every hospital in the country. Importantly, it gave us the power to sort human chromosomes. These two advances were driven by the inquiring minds of LANL researchers working sometimes in the health effects program and sometimes, in the case of Walter Goad, completely outside of the arena of health effects. The initial discussions for the human genome project were held in Santa Fe in the early '80s. LANL was the principle mover and shaker in framing the objective of sequencing of the human genome and over a very controversial decade helped to gain communitywide support for that project.

Lab director John Browne recognized that there is great potential in bioscience and biotechnology in the 21st century if they could bring together the biological, physical and engineering sciences. He took the unprecedented step of forming Bioscience Division, which specifically is designed to bring together biology, chemistry, computational sciences, and biophysics in order to be able to address our continuing concerns on human health effects and now the area of biological threat reduction. There is increasing recognition that biological threat agents -- agents that are either toxic or infectious -- could be used either by rogue states or by terrorist groups as weapons. In addition, we face challenges from nature in the form of naturally emerging diseases.

Johnsen: The Department of Energy, in general, from the days of the Atomic Energy Commission, has had a long history of support of biological research at a number of its facilities around the country. Los Alamos among them. Another one that comes to mind, privatized a few years ago, was the then-named Inhalation Toxicology Research Institute in Albuquerque, which conducted research associated with the inhalation of radionuclides to set the initial standards for worker exposure. Bioresearch is not new work. It has just assumed much greater importance because of the new technologies that are available along with the recognition of the threat potentially posed by some of the applications for some of these technologies.

What is the real mission?

Trewhella: In the 20th century, a number of nation states did pursue offensive biological weapons research. The biggest effort that has been documented was undertaken by the former Soviet Union. They began as early as 1918, and expanded into a very large activity, stockpiling very large amounts of biological agents. Japan also pursued a very aggressive biological weapons offensive program and engaged in human experimentation before and during World War II. In the modern world, we know from the United Nations missions in Iraq that Iraq aggressively pursued a biological weapons effort in the latter quarter of the 20th century. The United States also actively worked on an offensive biological program in the past, beginning during World War II under the Roosevelt administration to protect our troops from a perceived threat from Germany. The program began with a $200,000 investment by the U.S. government and with the support of the National Academy of Sciences and many prestigious academic institutions in the country. It continued and expanded until the late 1960s and early 1970s. It was ended unilaterally by an Executive Order issued by President Nixon in 1972, declaring an end to all offensive biological research in the United States and the destruction of all stockpiled agents. The position that the U.S. government took and continues to support is that there is no justification, including retaliation, for offensive biological weapons research or use. We operate today under that presidential order, and fully support that position..

It is interesting to note that the principle legacy of the early U.S. program is the modern standards for biological safety. The industrial standards, the Centers for Disease Control and Prevention (CDC) standards that we use today for handling biological agents really came out of the work that was done in that U.S. program. The Laboratory has an exceptional record of safe work with biological agents as a result of research and development that was done in the past.

Johnsen: Another interesting point on that: even at the height of the defensive weapons research in the '40s and '50s, early '60s, the United States never studied agents for which there was not a vaccine or other cure available.

What about safety?

Trewhella: We use the standards and procedures documented by the CDC and required by federal law for all institutions engaged in biological research.

Johnsen: The DOE also has had general policies and procedures on health and safety, but we recognizethat additional policies may be necessary. We continue to work are on those and a number of recent improvements have been implemented in our reporting procedures. The DOE recognizes the accepted safety standards for biological hazards documented by the CDC and we don't feel there is a need to develop a separate set of standards or DOE orders. There may be changes to existing orders as the scope of this work expands, to just call out biology as a specific hazardous class such as electrical or nuclear. Former Secretary of Energy Bill Richardson directed that a headquarters-level group look at existing policies and make recommendations to the secretary's office regarding safety procedures. That set of recommendations has been developed and very little in the way of any additional changes is expected as a result of that. Oversight will be very much like it has been in other ESH areas and we certainly plan to recognize biology as a hazard class and work with the laboratories to address any shortfalls that may exist in the reporting arena. This work that the Labs are doing is very important work. And like so much other work at our laboratories, there are always hazards and risks, mitigated by procedures that have been in place or are being further refined, in the case of biological research, for many decades.

One of the recommendations from the national working group that will be implemented is that there will be Institutional Biosafety Committees (IBCs) established at all DOE laboratories in biology work It has been shown that an IBC is a very effective administrative mechanism, not only for peer review and screening work but also for answering public inquiries. It's important to note that under current planning in DOE's Albuquerque office, the IBC member from the Deparment will be a full participatory member in Los Alamos' IBC but will not vote on whether specific work proposals should go forward because of the department's oversight role. The DOE member on the IBC will be a person with the requisite science background and experience to recognize the safety implications of proposed projects and will serve as a two-way information conduit between the Lab and the DOE.

Trewhella: We've had an IBC in place at Los Alamos for more than 20 years. Our Institutional Biosafety Committee is an independent group that reports directly to the Lab Director, not to any line management overseeing this work. The IBC has the authority to say "yes" or "no" to any work proposed with biological hazards and that includes work in the open areas as well as any classified work that might be going on. The IBC includes staff members from the Laboratory, members from local health care providers and two members of the public not associated with the Lab or anyone whose work is under review. Currently we have a local doctor from the medical center, a retired high school science teacher and representation from the New Mexico State Health Department. The chair of the IBC committee is James Freyer from Biosciences Division. The committee meets on a regular basis and looks at all work being proposed. The committee has a Web page that's accessible to the public, describing all the work of biohazards going on at LANL (http://www.esh.lanl.gov/~esh5/biosafety/index.html). Their meetings are open to the public. We post the meeting minutes on the Web site and we also give prior notice that the meetings are coming up. The IBC ensures that all the biosafety regulations at LANL are implemented. Those policies and procedures incorporate all guidelines and recommendations from the CDC. We use CDC's handbook, Biosafety in Microbiological and Biomedical Laboratories, which is the national standard that all research institutions doing biological research use.